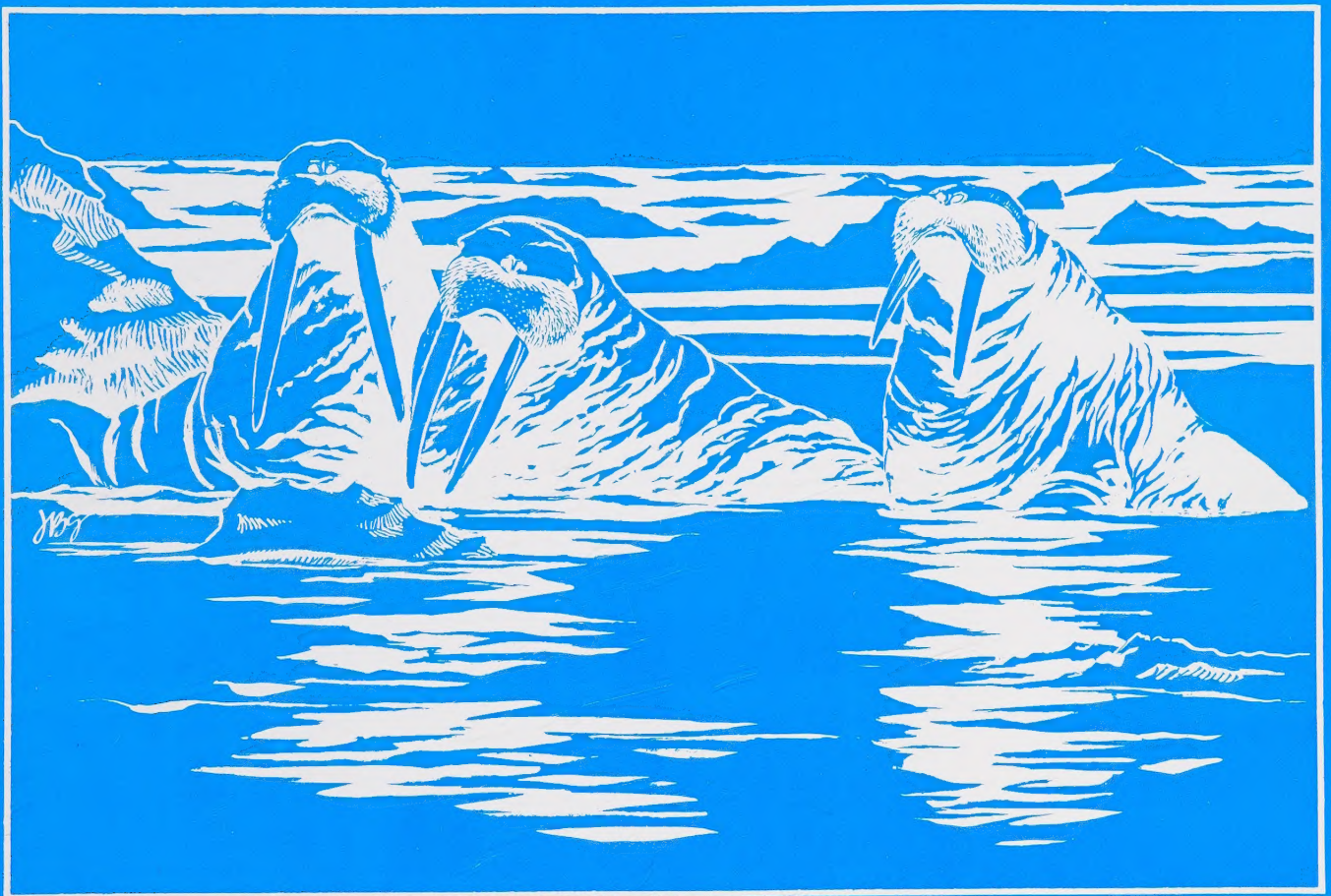


Administration of the Marine Mammal Protection Act of 1972

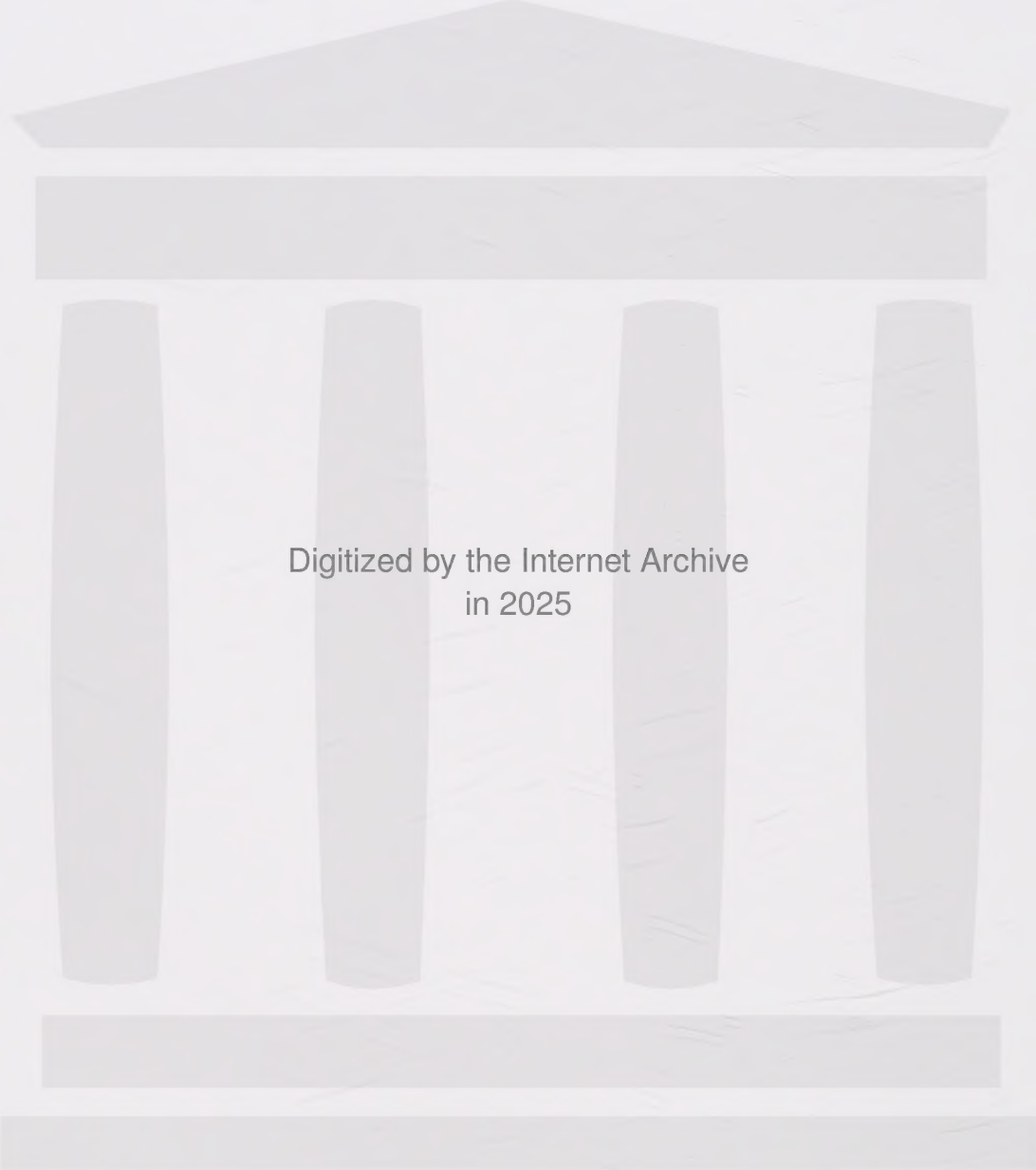
JANUARY 1, 1988 TO DECEMBER 31, 1988



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MARINE MAMMAL PROTECTION ACT OF 1972

Annual Report

January 1, 1988 - December 31, 1988

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Prepared by
Department of the Interior
U.S. Fish and Wildlife Service
Washington, D.C. 20240

DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
MARINE MAMMAL PROTECTION ACT

Report of the Department of the Interior

The Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361-1407, 86 Stat. 1027 (1972), 95 Stat. 979 (1981), 98 Stat. 440 (1984), 100 Stat. 3741 (1986), and 102 Stat. 4755 (1988)) states in Section 103(f) that:

"Within six months after the effective date of this Act [December 21, 1972] and every twelve months thereafter, the Secretary shall report to the public through publication in the Federal Register and to the Congress on the current status of all marine mammal species and population stocks subject to the provisions of this Act. His report shall describe those actions taken and those measures believed necessary, including where appropriate, the issuance of permits pursuant to this title to assure the well-being of such marine mammals."

The responsibility of the Department of the Interior is limited by Section 3(11)(B) of the Marine Mammal Protection Act to those marine mammals that are members of the orders Carnivora (polar bear, sea otter, and marine otter), Pinnipedia (walrus), and Sirenia (manatee and dugong). Accordingly, published herewith is the report of the Department of the Interior for the period of January 1, 1988, to December 31, 1988, on the administration of the Marine Mammal Protection Act with regard to those mammals.

Issued at Washington, D.C., dated

OCT 17 1989

Acting
Deputy

Richard M. Smith
Director

ADMINISTRATION OF THE MARINE MAMMAL PROTECTION ACT OF 1972

January 1, 1988 - December 31, 1988

Report of the Department of the Interior

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INTRODUCTION

AUTHORITY

The passage of the Marine Mammal Protection Act of 1972, hereafter referred to as the Act, gave the Department of the Interior responsibility for manatees, polar bears, walruses, sea and marine otters, and dugongs. Within the Department of the Interior, the Fish and Wildlife Service (Service) is responsible for managing these marine mammals and for enforcing the moratorium on taking and importing marine mammals and marine mammal parts.

The Service administers requests for waiving the moratorium and for the transfer of management authority to States, issues permits, conducts research programs, enforces provisions of the Act, publishes rules and regulations to manage marine mammals, cooperates with the States, and participates in international activities and agreements. In addition, the Service lists and delists species as endangered or threatened and undertakes other Endangered Species Act-related responsibilities and maintains a close working relationship with the Marine Mammal Commission and its Committee of Scientific Advisors.

General information on distribution and migration, abundance and trends, general biology, ecological problems, allocation problems, regulations and research can be found in the 1979 annual report. Thus, it is not repeated here. There were no significant changes during this report period in the status of any of the species of marine mammals whose management is the Service's responsibility.

SPECIES LIST

Species List with the Status of Marine Mammals with Service Jurisdiction
Under the Marine Mammal Protection Act and the Endangered Species Act

<u>Species</u>		<u>Marine Mammal</u>	<u>Endangered</u>
<u>Scientific Name</u>	<u>Common Name</u>	<u>Protection Act</u>	<u>Species Act</u>
<u>Ursus maritimus</u>	Polar bear	Yes	No
<u>Enhydra lutris</u>			
<u>lutris</u>	Sea otter-Alaska	Yes	No
<u>Enhydra lutris</u>			
<u>neréis</u>	Sea otter-southern	Yes	Threatened
<u>Lutra felina</u>	Marine otter	Yes	Endangered
<u>Odobenus rosmarus</u>	Walrus	Yes	No
<u>Dugong dugon</u>	Dugong	Yes	Endangered
<u>Trichechus manatus</u>	West Indian manatee	Yes	Endangered
<u>Trichechus inunguis</u>	Amazonian manatee	Yes	Endangered
<u>Trichechus</u>			
<u>senegalensis</u>	West African manatee	Yes	Threatened

APPROPRIATIONS

The most recent funding authorization by Congress for the Service was under Section 116 of the amended Marine Mammal Protection Act (16 U.S.C. 1361-1407, 86 Stat. 1027 (1972); 98 Stat. 440 (1984) for Fiscal Years 1985 through 1988; and 102 Stat. 4755 (1988) for Fiscal Years 1989 through 1993. Calendar Year 1988 covered by this report overlaps FY 1988 and FY 1989, and funds authorized and appropriated for both fiscal years are shown below.

Reporting Year (January 1 to December 31, 1988) Funding (in \$000):

	<u>Marine Mammal Protection Act Section 114</u>	
	<u>Authorized</u>	<u>Appropriated</u>
Fiscal Year 1988	\$3,000	\$2,707
Fiscal Year 1989	\$3,000	\$2,421



A polar bear in Alaska. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

Distribution of appropriations (in \$000):

	Actual FY 88	Appropriated FY 89
<u>Marine Mammal Protection Act</u>		
Research and Development		
Alaskan sea otter	\$ 288	\$ 311
Southern sea otter	300	0 <u>1/</u>
Walrus	298	200
Polar Bear	<u>756</u>	<u>867</u>
Total Research	<u>\$1,642</u>	<u>\$1,378</u>
Management		
Permit activities	\$ 30	\$ 30
Law enforcement activities	509	473
Other management activities	<u>526</u>	<u>540</u>
Total Management	<u>\$1,065</u>	<u>\$1,043</u>
Grand Total	<u>\$2,707</u>	<u>\$2,421</u>
<u>Endangered Species Act</u>		
Section 6 (Grants-to-States)		
California - Sea otter	\$ 106	\$ 100
Florida - Manatee	<u>75</u>	<u>105</u>
Total Section 6	<u>\$ 181</u>	<u>\$ 205</u>
Section 15		
Research and Development		
Endangered/threatened otters	\$ 456	\$ 756
Manatee	310	325
Monk seal	<u>0</u>	<u>0</u>
Total Section 15 Research	<u>\$ 766</u>	<u>\$1,081</u>
Management		
Endangered/threatened otters	\$ 448	\$ 390
Manatee	75	75
Monk seal <u>2/</u>	<u>10</u> <u>3/</u>	<u>0</u>
Total Section 15 Management	<u>\$ 533</u>	<u>\$ 465</u>
Grand Total	<u>\$1,480</u>	<u>\$1,751</u>

1/ Funds previously reported for southern sea otter research and development under the Act are now reported under the Endangered Species Act.

2/ Although the National Marine Fisheries Service has primary responsibility for monk seals, the species utilizes the Hawaiian Islands and Johnston Atoll National Wildlife Refuges.

3/ Spent for Hawaiian monk seal activities on the Hawaiian Islands National Wildlife Refuge under authority of the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee).

SUMMARY OF 1988 PROGRAM

OUTER CONTINENTAL SHELF OPERATIONS AND ENVIRONMENTAL STUDIES

The Service participates in the Department of the Interior's Outer Continental Shelf Oil and Gas Leasing Program by providing advice, review, and input at various stages in the leasing, exploration, development, and production process. The Service provides technical expertise on the management of fish and wildlife resources and related habitat.

During the report period, the Service participated in several lease sale processes and reviewed and offered measures for the protection of marine mammals and other species. The lease sales that the Service dealt with were in the Central Gulf of Mexico (Sale 118), the Western Gulf of Mexico (Sale 122), and the Mid-Atlantic (Sale 121); none of these involved marine mammals. Two other Outer Continental Shelf activities did, however, involve the manatee, i.e., a National Pollutant Discharge Elimination System permit for Central/Eastern Gulf of Mexico, and an exploration permit for Union Exploration Partners Limited in the Eastern Gulf.

For the Alaska region, the Service reviewed the Navarin Basin lease area, which involved walrus and polar bear. For the West Coast, the Northern California lease area was reviewed in which the southern sea otter was involved.



Sea otters resting in coastal habitat in Alaska. Haul out areas are an essential component of sea otter habitat in Alaska. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

RESEARCH AND DEVELOPMENT

The Service conducted research under the Act during FY 1988 at several Centers and Field Stations. The Alaska Fish and Wildlife Research Center is responsible for polar bear, walrus, and northern (i.e., Alaska) sea otter research. The National Ecology Research Center (Fort Collins, Colorado) is responsible for all other marine mammal research, including the southern sea otter, manatees, and other depleted species. The Cooperative Fish and Wildlife Research Units Center conducts additional research to support the needs of Service Regions, and other Service Research Centers. For each project active during FY 1988, the project title and summary, followed by highlights of results to date are given below by species.

1. Polar bear

A. Project Title and Summary: Distribution, timing, and importance of polar bear denning in northern Alaska.

Female polar bears captured in October and November or March and April will be fitted with radio collars and subsequently followed to their maternity dens. Activities of instrumented bears will be monitored during den entrance, occupancy, and emergence periods. Evidence of 17 new polar bear dens in Alaska's Beaufort Sea region was found. Ten dens were located by radio telemetry: seven of those were at sea, two on land and one either on land or fast ice. Evidence of seven other dens on land was discovered without telemetry. Preliminary results have been summarized in a report and two publications, and a major manuscript is planned for 1989.

Results to date:

- o Eighty-eight dens have been found in the Beaufort Sea Region since 1981. Seventy-five percent of those dens have been on drifting pack ice, 15 percent on land, and the remainder on fast ice. Most dens on land have been found on the Alaska National Wildlife Refuge.

B. Project Title and Summary: Population definition and estimation of survival, recruitment, and numbers of polar bears in the Beaufort Sea.

During March, April, and May, Alaskan polar bears captured in the northern portion of the State will be permanently marked. Assessment of critical population parameters will be achieved by analysis of mark/recapture data, catch/effort analysis, and mathematical simulations. Estimates of reproductive success of ten adult females were obtained in 1988. Annual survival was determined for several females and cub litters of various ages. Preliminary evidence suggests the ratio of stable isotopes of carbon in keratinous tissues of polar bears may be very valuable in describing where individual bears occurred during the preceding year. Ultimately, carbon isotope ratios will be combined with telemetry data to help define populations.

A manuscript summarizing annual and seasonal movements of polar bears in the Beaufort Sea is planned for 1989.

Results to Date:

o Reproductive success has now been verified for 55 females that entered maternity dens. Available data suggest animals denning on land are more successful than those denning at sea. Continued observation and telemetry data have verified segregation among bears of northern and western Alaska. However, the degree of segregation varies annually.

- C. Project Title and Summary: Relationships between polar bears, sea ice movement and condition, and pagophilic seals.

High altitude aircraft and satellite imagery will be used along with drifting buoy data to classify ice movements and conditions. Foraging methods used by polar bears will be determined by radio tracking and snow tracking. Prey species, frequency of kills, habitat types and hunting methods will be recorded. Logistical problems including failure of radio transmitters, inclement weather conditions, and unusual distributions of collared animals prevented much progress on this work unit in 1988. Progress was made toward obtaining public and private sector sea ice images, but analyses have not been conducted. Difficulties encountered this year have caused a reassessment of methodologies employed. This portion of the work unit using dogs to evaluate seal distribution and numbers will be deleted unless additional funding is acquired in order to provide resources for polar bear habitat relationship sections.

Results to Date:

o Polar bear hunting behavior and habitat selection shift markedly in mid-spring to capitalize on availability of newborn ringed seals. Male polar bears hunt less intensively than females at this time because they are preoccupied with breeding activities.

- D. Project Title and Summary: Population definition and estimation of survival, recruitment, and number of polar bears in northwestern and western Alaska.

During March and April, Alaskan polar bears captured in the western portions of Arctic Alaska will be permanently marked. Assessment of critical population parameters will be achieved through continued analyses of mark/recapture data, catch/effort data, and mathematical simulations. Twenty satellite collars were deployed on female polar bears in the Bering and Chukchi Seas during March and April 1988. Locational data were incorporated into the Geographic Information System and numerous home range programs became operational on the regional computer system. A formal exchange of information with Soviet scientists was initiated. A draft report of census test methods was completed and a final report is being prepared.



A U.S. Fish and Wildlife Service wildlife research biologist placing a satellite collar on a polar bear in Alaska. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

Results to Date:

- o The data base on western Alaska polar bear movements was greatly expanded and the sharing of polar bear resources with the Soviet Union was verified.
- o A formal exchange of information on polar bears was initiated with Soviet scientists through the Office of International Affairs and the State Department.
- o The pilot study of mitochondrial deoxyribonucleic acid (DNA) rapid sequencing and amplification was completed by cooperators. This study resulted in application of rapid analytical procedures to the polar bear mitochondrial DNA materials.

E. Project Title and Summary: Inter-relationships between sea ice habitats and polar bear distributions in the Bering and Chukchi Seas in northwestern Alaska.

Remotely sensed data on ice types, distributions, and movements are being analyzed with reference to concurrent locational data from satellite instrumented polar bears in the Bering and Chukchi seas. Location of denning activity is also being recorded via locational data from satellite-instrumented polar bears. Locational data were routinely integrated into the regional Geographic Information Systems. Advanced Very High Resolution Radiometry data were acquired for several ice edge scenes and are being evaluated for potential use in the project. Other sources of digitized ice data are being contacted for cost comparisons. A VCR camera system capable of producing digitized tape was tested in ice habitats.

Results to Date:

- o Locational data for polar bears was routinely added to the Regional Geographic Information System data base.
- o The VCR camera system shows potential for use in evaluating habitat use by polar bears.
- o Advanced Very High Resolution Radiometry data appear to have potential use in analysis of polar bear habitat use patterns on a large scale.

2. Alaska sea otter

A. Project Title and Summary: Biological information necessary to establish a zonal management program for sea otters in Alaska.

This study is designed to examine movements, mortality, and reproduction of sea otters at Kodiak Island (by Center staff) and Prince William Sound (by Cooperative Agreement). Funds were provided to personnel of the University of Minnesota to support an intensive study of movement and reproduction of sea otters in eastern Prince William Sound. We continued

to collect location fixes on radio-tagged sea otters at Kodiak Island and Prince William Sound. Visual sightings of marked animals were made as frequently as possible to document reproductive rates and dependency periods of pups. Dead sea otters were examined for mortality factors. Flipper tag transmitters were tested. Verification data for a line transect censusing technique were collected. The role of paralytic shellfish poisoning as a mortality factor is being evaluated. A Research Information Bulletin on the performance of the flipper-tag transmitters was published. A manuscript on sea otter mortality at Kodiak Island was submitted to the Journal of Mammalogy. (Note: Because of the March 24, 1989, Exxon Valdez oil spill in Prince William Sound, units of work reported here and research work in the planning stage may be affected as efforts are made to assess the damage to sea otter populations.)

Results to Date:

- o Mortality of sea otters at Kodiak Island was substantially higher than in Prince William Sound. Females of reproductive age appear to produce single pups annually. Telemetry work at both sites has documented seasonal shifts in habitat use.

B. Project Title and Summary: Interactions between sea otters and fisheries in Alaska.

Research was continued at Kodiak Island along two fronts: (1) a description of sea otter diets with an emphasis on the importance of commercial species of shellfish, and (2) an investigation of the impacts of foraging by sea otters on subtidal benthic communities. Information on food habitats of sea otters was collected at Kodiak Island in areas occupied by sea otters for varying lengths of time. Data on shellfish mariculture were collected and analyzed. A pot fishing program for dungeness crab was established in southeastern Alaska in regions occupied and unoccupied by sea otters. Sea otter-prey interactions were investigated in the Shumagin Islands and Sitka Sound. A report on potential conflicts between sea otters and humans over shellfish resources in southeastern Alaska was prepared.

Results to Date:

- o Telemetry data at Kodiak suggest a movement of sea otters into Chiniak Bay. Fisheries conflicts are likely to develop over dungeness crabs and sea urchins in that area. Elsewhere at Kodiak Island commercially valuable shellfish species do not figure importantly into sea otter diets. Preliminary data suggest that little regard to sea otter distribution has been given to siting of mariculture operations. Limited data from southeastern Alaska suggest that red sea urchins are important prey of sea otters in newly-invaded habitat on the outside coast. A commercial fishery for that species exists but it is likely to remain small. The dungeness crab was identified as the species most likely to be impacted by sea otter predation in southeastern Alaska.

- C. Project Title and Summary: Basis of estimating sustained yield, and means to regulate population size and dispersal relative to sea otter management in North America.

More than 3,500 sea otters were counted in southeastern Alaska in five populations in 1987 from an original 402 animals released between 1965 and 1968. Plans are underway for an experimental manipulation of one or more sea otter populations in southeastern Alaska to test hypotheses related to range expansion and, hence, zonal management.

Results to Date:

- o Populations of sea otters in southeastern Alaska continue to grow exponentially. Investigators had difficulty maintaining precision of counts using repeat-censusing from skiffs in even small populations of sea otters.



An Alaska sea otter being released after surgical implantation of a radio transmitter. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

3. Pacific walrus

- A. Project Title and Summary: Techniques to monitor movements for population assessment, age/sex composition, behavior, and estimates of populations of walrus.

Satellite transmitters will yield data concerning spatial and temporal distribution and haul out behavior of Pacific walruses that are necessary to quantify biases in the joint US-USSR walrus survey results. Research to develop immobilization techniques, radio-tag housings, and attachment procedures were completed along the polar ice edge and land haul out areas. Mitochondrial DNA techniques to separate walrus stocks were investigated. Software and firmware to assess walrus behavior and movements were developed for satellite transmitters. The second year of formal training of a cooperative education student was completed. Soviet scientists cooperated with the field evaluations. Functional operational techniques have been developed to assess the biases and improve the accuracy and precision of the joint US-USSR survey. The Soviets were highly supportive of the research and have proposed an expanded cooperative effort.

Results to Date:

- o Drug delivery methods were field tested and assessed.
- o One VHF and four satellite transmitters were deployed on walruses in the eastern Chukchi Sea.
- o Two Soviet scientists, Drs. Lev Popov and Arkandii Kibal'chich, worked with the project at Wainwright, July 16-25, 1988.
- o Teeth from four animals, and reproductive tracts, stomach contents, liver, and kidney specimens from two females were collected.

- B. Project Title and Summary: Walrus harvest monitoring in western Alaska.

Determine the numbers, sex, and age of walruses taken by Alaska natives and collect tissue samples for contaminant analysis. Relative health of the walrus will be measured and subsistence harvest of other marine mammals and birds recorded.

Results to Date:

- o Evaluation of walrus harvest monitoring procedure enabled modification of sampling procedures to adjust for intensity of harvest by village and timing of harvest.

4. Manatee and dugong

- A. Project Title and Summary: Develop a generalized microcomputer capability for field offices to address large-scale resource assessment problems.



A U.S. Fish and Wildlife Service wildlife research biologist inspecting a bull walrus on Round Island, Alaska. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

Develop a prototype system of a decision support tool that is compatible with existing personal computer standards currently at Service field offices. The prototype will be evaluated in an operational setting in support of Section 7 consultations on the Florida manatee and to track location, status, and success of mitigation activities. A prototype microcomputer system for the data entry and editing of spatial information was developed. Geographic location information can be transformed into several different geographic projections and combined with the prototype's data bases.

Results to Date:

- o Capabilities were demonstrated using manatee mortality and sighting data in a three county area in eastern Florida at the Endangered Species Office in Jacksonville, Florida.
- o The prototype is being finalized for transfer to, and use by, the National Ecology Research Center's Sirenia Project in Gainesville, Florida.

B. Project Title and Summary: Ecological studies of manatees and dugongs.

This work is concerned with obtaining data on status of populations of Sirenians throughout the geographic range of that Order, to obtain estimates of population levels, and to evaluate the potential of surveys in selected areas as indices of population densities and movements. Radio telemetry studies of manatees on the east coast of Florida continued with an increase in the number of individuals monitored. Sixteen new animals were tagged, including two released, rehabilitated individuals. Movements were also monitored for an additional six manatees initially tagged in previous years. Most were monitored by VHF transmitters, but satellite transmitters were deployed on eight individuals. Winter feeding impact studies on Hobe Sound seagrass beds were initiated, and stomach content analysis continued. Evaluation of aerial survey methods progressed, and a cooperative manatee status and distribution study was completed in Panama. Collection of longitudinal life history data at Crystal River and Blue Spring continued, and monitoring of individuals by scar patterns increased on Florida's east coast.

Results to Date:

- o Manatee movement data show that seasonal migrations and within-season movements on Florida's east coast are extensive and complex. Rates and timing of movements, stopover areas, and other ecological information are being gathered. Information on use of key areas is being used as it develops by management agencies in planning permitting policies, habitat acquisition, and regulation of waterborne activities.
- o Feeding studies show use of a wide variety of plants in the diet, and that up to 95 percent of the shoot biomass and 58 percent of the shoot and rhizome biomass is removed in feeding patches in seagrass beds.

- o Sample sizes on inter-birth interval and age at first reproduction were increased by the scar-pattern based life history studies.

- o The existence of a remnant, isolated population of manatees on the northwestern Caribbean coast of Panama was documented.

C. Project Title and Summary: Hobe Sound seagrass study.

Hobe Sound is a valuable natural resource containing well-developed seagrass meadows and algal beds that serve as nursery, breeding habitat, shelter, and feeding ground for important commercial and recreational fish species, as well as food for a population of manatees that over-winters locally. Concern for the interrelationships between a decline in water quality and the status of seagrasses has raised several questions. Observers have reported that over several years the turbidity in Hobe Sound has increased coincidental to the intensity of boat traffic. These observers support a concurrent change proposal that a rule be adopted limiting boat speeds and wakes. As the information supporting the adoption of the proposed rule is based on qualitative and subjective observations, this study approaches the problem with a scientifically valid research program. Aerial photography was completed for mapping grassbeds with excellent results. Field sampling over four quarterly intensive periods resulted in a detailed characterization of the composition, productivity, and biomass of the seagrass community. Weekly intensive light sampling was completed, as well as gathering of data on boat traffic and short-term boat-wake effects on light attenuation.

Results to Date:

- o Only low-light-adapted species occur at depths exceeding 2.0 meters in Hobe Sound, suggesting that submarine light availability may be limiting the overall abundance of seagrasses in the sound; values for net leaf production were also at the lower end of the reported values for subtropical seagrasses elsewhere. Submarine light attenuation coefficients ranged from 0.40 to 1.72, and maxima were due to a major storm event. Boat wake plumes re-suspend sediments and cause an increase in the coefficient.

D. Project Title and Summary: Manatee protection project: Survey of boat usage patterns.

The Florida population of the West Indian manatee consists of approximately 1,200 individuals. Average known mortality has been increasing from approximately 90 per year (1976-1983) to 130 per year (1984-1985). Human-caused mortality, crushed or fatally injured by boats, crushed in locks or water control structures, and poaching account for approximately one-third of all known mortality. The objective is to maximize validity of location, duration, and types of boating activities that affect manatee habitats and their relationship to marine boat launching ramps, multifamily docks, single (private) family docks, etc. This will be done in two Citrus County locations.

E. Project Title and Summary: An evaluation of manatee distribution patterns in response to public use activities: Crystal River, Florida.

The proposed studies are designed to analyze the distribution response of manatees in warm water sanctuaries of the Crystal River Refuge in response to weather patterns and public-use activities during the over-wintering period of 1988. The studies will include evaluations of observation techniques including aircraft types, photography versus direct observations, transect patterns, and time intervals. The study area is confined to the waters of the Kings Bay reach of the Crystal River in Citrus County, Florida. The area is entirely within the Crystal River National Wildlife Refuge and specifically inclusive of waters in the Bay south of Warden Key and Banana Island. This area of approximately 709 acres is considered critical, or core, habitat to the manatee. The objectives of the study are the following:

- o To determine manatee use patterns in the study area in response to types, volume, and time of public use activities.
- o To identify and measure objective criteria for determining cumulative impacts of human recreational activities on distribution and abundance of manatees.
- o To determine threshold levels of activities that influence manatee distributions.
- o To synthesize existing spatial and temporal information on the study area.

F. Project Title and Summary: An evaluation of cumulative impacts to the habitat of the West Indian manatee, Crystal River National Wildlife Refuge.

Use of the recreational center at King's Bay for boating, diving, sailing, and fishing is estimated at 600 people per week day and 1,302 people per weekend day. Manatee wintering in the area have increased from 115 in December 1983 to 161 in January of 1987. Continued use of the manatee habitat is threatened by water-borne activities of developers of, and owners of newly-developed property at, King's Bay. The objectives of this study are the following:

- o To develop a specially referenced database from existing and new information on land use, submerged vegetation covering, herbicide applications, and manatee use pattern.
- o To conduct trend analysis for cumulative impacts in order to predict threats and conflicts to manatees to determine threshold levels of activities that influence manatee distributions.
- o To develop and synthesize information necessary for effective management decisions.



A West Indian manatee cow and her calf. U.S. Fish and Wildlife Service photo by Galen Rathbun.

5. Southern sea otter

A. Project Title and Summary: Ecological studies of sea otters and other marine mammals.

This study is to determine the home range, life range, and territory size of adult and subadult sea otters in central California; to describe dispersal data to population phenomena observed in central California, to determine trends in the size and distribution of sea otter populations; and to estimate the size of the adult population of sea otters. Counts of the nearshore sea otter population along the central California coast were completed, and analyses of the long-term history information (birth rates, birth intervals, and longevity) were continued.

Results to Date:

- o Range-wide counts were completed during November 1987 and May-June 1988, when 1,367 and 1,724 sea otters were counted, respectively.
- o Weekly searches of the northern San Luis Obispo County, California, area were made to re-identify individual sea otters.
- o Observations on foraging behavior and diet were completed on sea otters in the Point Piedras Blancas and Point Buchon areas.
- o Monthly beach walks along a 10-mile section of coast in northern San Luis Obispo County were continued to document marine mammal and bird mortality.
- o Three papers were published in journals and symposia, and one manuscript was submitted for publication.

B. Project Title and Summary: Interactions between sea otters and nearshore ecological communities.

This study is to determine the preferred prey species and activity pattern of sea otters, and to clarify the substantial interactions that take place between sea otters and invertebrates and plants in the environment. Field research continued in 1988 in the following areas: (1) baseline sampling at San Nicolas Island; (2) special focus ecological study at San Nicolas Island; (3) large-scale nearshore community descriptions in southeastern Alaska and British Columbia (the results of which should be useful in the recovery and management of southern sea otters); and (4) kelp forest ecology in central California. Data have been entered on microcomputers and are being analyzed for publication. Work is being done by Service Research staff and through a Cooperative Agreement with the University of California, Santa Cruz.

Results to Date:

- o Eighteen field trips were made to monitor effects of translocated sea otters on nearshore ecosystem at San Nicolas Island.
- o As part of the Cooperative Agreement with the University of California at Santa Cruz, several graduate students were advised, guest lectures were presented, and a course in kelp forest ecology was taught.
- o Seven papers were published in journals and symposia, one book was published, and one manuscript was submitted for publication.

C. Project Title and Summary: Translocation of sea otters.

This project involves the capture, transport, and release of sea otters to San Nicolas Island from the vicinity of Morro Bay, California, in order to: (1) establish a viable colony of sea otters; (2) determine changes in distribution and abundance of sea otters in the parent and translocated

populations; (3) determine changes in behavior and population parameters of sea otters at San Nicolas Island as the population grows from an initial small size to equilibrium density; and (4) establish criteria for determining the level of success of sea otter translocations as a management tool. The actual translocation of sea otters from the central coast to San Nicolas Island was continued during 1988. Although greater than expected stress-related mortality was experienced during the initial phases of the reintroduction effort, this problem appears to have been resolved.

Results to Date:

- o A detailed discussion of the effort to translocate sea otters to San Nicolas Island appears in the section of this report entitled, "Sea Otter-Southern."
- o Nine of the sea otters reintroduced were fitted with flipper-tag radios.
- o Daily information on the locations and movement patterns of sea otters at San Nicolas Island was collected.
- o Foraging behavior and composition of diet was determined for individual sea otters at San Nicolas Island.

ENFORCEMENT

The Service's Division of Law Enforcement investigates known, alleged, or potential violations of the Act involving illegal take or importation of marine mammals or their products for which the Service is responsible. In addition, it assists the National Marine Fisheries Service by making apprehensions and conducting investigations in cases involving endangered or threatened species under that agency's jurisdiction. Results of these efforts are referred to the National Marine Fisheries Service for its consideration and appropriate action. However, under a National Marine Fisheries Service/Service Memorandum of Understanding, the Service retains authority over those investigations that involve endangered or threatened species under the jurisdiction of the Department of the Interior. Violations are referred to the Department of the Interior's Office of the Solicitor for civil action or to the Department of Justice for criminal action.

One-hundred and ten marine mammal investigations were pending as of December 31, 1987, and Service agents initiated 128 new investigations during 1988. Eighty-nine marine mammal investigations were closed during the year, leaving 149 investigations pending as of December 31, 1988. (Note: The number of investigations pending as of December 31, 1987, as reported in the Service's Calendar Year 1987 Marine Mammal Protection Act Annual Report does not agree with the number of investigations shown above as pending on the same date. The difference results because the computer data base used by the Division of Law Enforcement to maintain these records is dynamic and, therefore, constantly updated.)

In addition to the above cases, a marine mammal investigation involving the taking of polar bears by American hunters in Canada and the subsequent smuggling of the bear hides into the United States is nearing a successful conclusion. The primary subjects were fined \$40,000, and sentenced to 10 years probation, 60 days in jail, and 100 hours of community service. As a result of this investigation, over 100 subjects have been identified, resulting in 10 convictions totalling \$102,000 in fines and the forfeiture of eight polar bear skins and seven seal skins valued at \$100,000. The conviction and fine totals are likely to increase substantially before this investigation is concluded. The case has also resulted in 14 felony indictments in Canada.

Alaska Law Enforcement Actions

During 1988, the Service, in Alaska, opened 24 new cases, closed 35 cases, and had 48 cases left pending. Priorities were to close old cases and investigate cases involving take or sale.

The most significant cases in 1988 involved wasteful take of walrus. A 1987 case involving the killing of six walrus by two Alaskan Natives was concluded; only a small amount of meat was taken from the walrus. The Natives pleaded guilty and were sentenced to 1 year in jail, with all but 3 weeks suspended. They were placed on probation for 1 year. This was the first successful prosecution of an Alaskan Native for "wasteful take" of a marine mammal. Another "wasteful take" case was investigated in which three Alaskan Natives killed nine walrus. Again, they only took a small amount of meat. This case was pending at year's end.

PERMITS AND REGISTRATIONS

The Act prohibits the take or import of marine mammals and marine mammal products although exceptions may be made under permit for scientific research, public display, or, since the November 23, 1988, amendments to the Act, to enhance the survival or recovery of a species or stock. Registered agent permits may also be issued to authorize the buying or selling of raw marine mammal parts or products by non-Alaskan Natives (i.e., persons other than Alaskan Indians, Eskimos, or Aleuts) or to enable marine mammal hides to be tanned to facilitate trade of these products among Alaskan Natives.

Section 104 of the Act authorizes the Director of the Service, acting on behalf of the Secretary of the Interior, to issue permits for scientific research, public display, or enhancing the survival or recovery of a species or stock. Permitting provisions are set out in Title 50 of the Code of Federal Regulations -- 50 CFR 18.23(d) for registered agent/tannery permits and 50 CFR 18.31 for scientific research or public display permits. Regulations presently are being developed for issuance of permits for enhancement of survival or recovery of a species or stock.

During 1988, no new permits were issued for scientific research but seven were amended and/or renewed. One new permit was issued for public display and three were renewed, and 11 permits were issued or renewed for registered agent/tannery.

The following is a brief description of permit actions taken in 1988.

Scientific Research Permits

1. PRT-691972, Carle Foundation Hospital, Urbana, Illinois, was renewed 7/8/88 for the importation of two live polar bears and biological tissue samples from Manitoba or the Northwest Territories, Canada.
2. PRT-696107, California Department of Fish and Game, Sacramento, California, was renewed 4/19/88 authorizing the take (herding experiments and tagging) of southern sea otters.
3. PRT-690715, U.S. Fish and Wildlife Service, Alaska Fish and Wildlife Research Center, Anchorage, Alaska, was renewed and amended 4/29/88 authorizing take (harassment) of walrus. The permit authorizes marking, tagging including external radio-tagging, and testing of immobilizing drugs administered by a veterinarian. The permit also authorizes importation of biological tissue samples of walrus. The permit was amended 5/10/88 expanding the types of immobilizing drugs to be tested, and again on 8/19/88 authorizing retrieval of a nonfunctioning satellite transmitter from a walrus.
4. PRT-708155, U.S. Fish and Wildlife Service, Alaska Fish and Wildlife Research Center, Anchorage, Alaska, was renewed and amended 6/22/88 authorizing take (harassment) of Alaska sea otters. Activities include marking, tagging, external radio-tagging, and feeding studies to examine the effects of paralytic shellfish poison.
5. PRT-717318, U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Portland, Oregon, authorizing the take (capture, tag, and translocation to San Nicolas Island) of southern sea otters, was amended 1/21/88 to authorize the use of external (Temple tag) radio-transmitters on the sea otters to be translocated in 1988, and again on 8/19/88 to authorize the use of the external radio-transmitters on all of the sea otters the permittee is authorized to take under the permit.
6. PRT-716436, Charles Monnett, University of Minnesota, Minneapolis, Minnesota, authorizing the take (mark, tag, including external radio-tagging using temple tag transmitters and surgically implanted radio transmitters) of Alaska sea otters, was amended 3/3/88 to authorize the take of 320 additional sea otters during 1988 and 1989, and to authorize the use of a modified internal radio package in ten of the otters, and temple tag transmitters on 50 otters.
7. PRT-707688, Donald Siniff, University of Minnesota, Minneapolis, Minnesota, authorizing take (mark with transponder chip, surgical implant of radio transmitter, relocate up the California coast) of 11 southern sea otters, was renewed and amended on 3/4/88 to authorize the use of external temple tag transmitters in lieu of implanted radio transmitters.

Public Display Permits

1. PRT-724794, Adventure World, Wakayama Prefecture, Japan, was issued 3/14/88 authorizing the take (capture and export) of two (one male and one female) Alaska sea otters.
2. PRT-718972, Hiroo Aquarium, Hokkaido, Japan, was renewed 3/14/88 authorizing the take (capture and export) of one male and four female Alaska sea otters. No otters were taken under the previous permit.
3. PRT-718896, Marine Palace, Limited, Oita Ecological Aquarium, Oita, Japan, was renewed 3/14/88 authorizing the take (capture and export) of one male and four female Alaska sea otters. No otters were taken under the previous permit.
4. PRT-693357, Oregon University Visual Arts Resources Center, Eugene, Oregon, was renewed 7/29/88 authorizing reimportation of an exhibit of Alaska Eskimo dolls, some of which were crafted using parts of walrus. The exhibit, which is the property of the Alaska State Council of the Arts, has been touring the United States and Canada.

Registered Agent/Tannery Permits

1. PRT-723077 was issued 1/25/88 authorizing Alaska Fur Exchange, Anchorage, Alaska, to act as an agent.
2. PRT-698161 was issued 4/4/88 authorizing Alaskan Arts, Anchorage, Alaska, to act as an agent.
3. PRT-704234 was issued 12/29/88 authorizing the Bear's Den, Olympia, Washington, to act as an agent.
4. PRT-699948 was issued 2/11/88 authorizing Brunner of Alaska, Anchorage, Alaska, to act as an agent/tannery.
5. PRT-731772 was issued 10/17/88 authorizing Curtis W. Cleveland, Point Hope, Alaska, to act as an agent.
6. PRT-732317 was issued 12/7/88 authorizing the Eskimo Walrus Commission, Nome, Alaska, to act as an agent.
7. PRT-671391 was issued 11/9/88 authorizing Frontier Tanning Company, Anchorage, Alaska, to act as an agent/tannery.
8. PRT-722022 was issued 5/24/88 authorizing International Carvers Associated, doing business as Down East Ivory, Weld, Maine, to act as an agent.
9. PRT-728139 was issued 7/15/88 authorizing James F. Reiss, Palmer, Alaska, to act as an agent.

10. PRT-691228 was issued 1/15/88 authorizing Vancouver Taxidermy and Royal Fur Dressing Inc., Vancouver, Washington, to act as a tannery.
11. PRT-731816 was issued 9/25/88 authorizing Wildlife Taxidermy, Mountlake Terrace, Washington, to act as a tannery.

INTERNATIONAL ACTIVITIES

Excess Foreign Currency Program

During this report period, the Service received no new congressional authorization for the use of excess foreign currencies, but continued to work in Egypt and Pakistan using carryover funds authorized in previous years. In addition, under the newly established US-India Fund, work was continued in India. Those authorizations were requested under Section 8 of the Endangered Species Act, that allows such funds to be expended on projects deemed by the Secretary of the Interior to be necessary or useful for the conservation of endangered or threatened species.

The Service continued its support for the development of Ras Mohamed Natural Protectorate, Egypt's first marine park, part of which is to develop a management plan that includes marine mammals. Additionally, support was provided for an Egyptian marine biologist to attend the Sixth International Coral Reef Symposium in Townsville, Australia, and the Joint Oceanographic Assembly in Acapulco, Mexico, that will lead to collaborative marine research in Egyptian waters that will include marine mammals.

US-USSR Environmental Agreement: Marine Mammal Project

In partnership with the National Marine Fisheries Service, the Service collaborated with the USSR Ministry of Fisheries and the USSR Academy of Sciences in a comprehensive program of laboratory and field research focusing on pinnipeds and cetaceans of mutual interest and importance. During 1988 twelve American and Soviet scientists took part in five exchanges totaling six man-months.

In June-July, two Soviet specialists traveled to Marmot Island off Kodiak, Alaska, for joint work on sea lion rookeries. Activities included immobilization, branding, radio tracking, and beach counts to determine age and sex distribution. Later in July, two Soviet biologists joined American colleagues in Wainwright, Alaska, for walrus immobilization, telemetry studies, and herd composition surveys. They also had the opportunity to visit rural villages on the Seward Peninsula and St. Lawrence Island to discuss subsistence hunting of walrus.

In the early fall, two Americans from Hubbs Marine Research Institute in San Diego traveled to the Soviet Union to continue studies of pinniped color pattern variations with colleagues at the Institute of Developmental Biology in Moscow. The following month, another American visited the same Institute for joint research on non-metrical characteristics (e.g., color patterns) of dolphins.

Finally, six Americans attended the US-USSR Marine Mammal Working Group meeting September 23-30 in Tallinn in the Soviet Union where the two countries reviewed the results of cooperation during 1987-1988, and agreed on activities for 1989 and the first half of 1990.

STATUS REPORTS

Reauthorization and Amendment of the Marine Mammal Protection Act (Act)

On November 23, 1988, President Reagan signed Public Law 100-711 amending the Act. The amendments affecting the Service are as follows:

1. Interim Exemption for Commercial Fisheries. This amendment authorized the Secretary of Commerce, for the 5-year period ending October 1, 1993, to issue exemptions from the Act's taking prohibitions to allow the incidental take of most marine mammals in commercial fishing operations (other than yellowfin tuna fishing). Of those species for which the Service has management responsibility, only the southern sea otter was totally excluded from the incidental take exemption; the intentional lethal take of manatees was also excluded. The amendment contains a number of provisions requiring, among other things, that the Secretary of Commerce:
 - establish a comprehensive list of fisheries and the level of incidental take (i.e., frequent, occasional, or remote/no known) of marine mammals in them;
 - establish a registration program for commercial fishermen;
 - establish a program by which incidental takes can be reported;
 - establish an "onboard" and an "alternative" observer program;
 - review and evaluate the effects of incidental taking on affected population stocks and provide for emergency or long-term regulation, as appropriate, if adverse marine mammal impacts develop;
 - publish a proposed regime to govern the incidental taking of marine mammals after October 1, 1993; and
 - consult with the Secretary of the Interior prior to making any decisions with regard to marine mammals for which the Secretary of the Interior is responsible.

While not specifically included in the legislation, the legislative history included the suggestion "...that a Memorandum of Understanding between the Department of Commerce and the Department of the Interior may be helpful in defining procedures and timetables for implementing this section." (Note: A Memorandum of Understanding between the Service and the National Marine Fisheries Service regarding implementation of the interim commercial fishing exemption was signed into effect on May 22, 1989.)

2. Status Reviews and Conservation Plans. In general, this amendment set forth procedures by which status reviews of marine mammals are to be conducted. It provided for public participation in the review process, provided that status determinations are to be made by rulemaking, and established a timeframe within which status reviews are to be conducted. Additionally, this amendment directed that conservation plans be prepared for any marine mammal species or stock found to be depleted unless it is determined that such plan will not promote the conservation of the species or stock.
3. Permits for Scientific Research, Public Display, or Enhancement of Survival or Recovery. This amendment expanded the purposes for which permits can be issued by authorizing their issuance to allow for the taking or importation of marine mammals to enhance the survival or recovery of a species or stock. The amendment imposed additional conditions on the issuance of permits for public display and scientific research, and included conditions governing the issuance of permits for take and importation for enhancing the survival or recovery of a species or stock. Additionally, the amendment expanded the authority of the Secretary of the Interior or his designees to allow for the importation of marine mammals without a permit if such importation is necessary to render medical treatment that is not otherwise available.
4. Authorization of Appropriations. This amendment authorized appropriations to the Department of the Interior for Fiscal Years 1989 through 1993 as follows: \$3,000,000, \$3,120,000, \$3,240,000, \$3,370,000, and \$3,500,000, respectively.

Incidental Take of Marine Mammals Associated With Specified Activities Other Than Commercial Fishing Operations

In 1986, the Act was amended to allow the incidental taking of small numbers of depleted, as well as nondepleted, marine mammals in specified activities other than commercial fishing. On March 15, 1988, a proposed rule was published in the Federal Register (53 FR 8473) that would implement this 1986 amendment. That proposed rule, developed by an Interagency Work Group consisting of representatives from the Service and the National Marine Fisheries Service, modified the definition of "negligible impact" and defined "unmitigable adverse impact" on subsistence and handicraft needs and would affect how those standards are applied in the existing regulations governing incidental taking of marine mammals associated with specified activities (50 CFR 18.27 and 50 CFR Part 228). In response to requests from several interested parties, the comment period on the proposed rule was extended until July 5, 1988 (53 FR 17964). More than 20 entities, including conservation groups, Federal, State and local government agencies, oil and gas companies and industry representatives, and other interested parties submitted extensive comments on the proposed rule. A final rule was subsequently drafted by the Interagency Work Group and is pending agency review at present.

A number of commenters to the March 15 proposed rule objected to the definition of "U.S. citizen" in the existing incidental take regulations in 50 CFR 18.27(c) and 50 CFR 228.3. They argued that the existing definition had the effect

of prohibiting U.S. chartered corporations, partnerships, associations, and similar entities not controlled by individuals who are United States citizens from obtaining Letters of Authorization to take marine mammals incidental to specific activities. The Service is actively considering the need for a regulatory revision to address this problem.

Incidental Take of Marine Mammals in Commercial Fishing Operations

On April 12, 1988, the Service published in the Federal Register a proposal to amend regulations in 50 CFR Part 18 that implement the Act. The proposed rule was intended: (1) to implement a provision of the Act to establish a system governing the taking of small numbers of nondepleted marine mammals incidental to commercial fishing operations; and (2) to implement a section of the Act that allows for the taking, with conditions, of marine mammals by government officials, employees, or designees. Public meetings on the proposed rule were held in Cordova, Alaska. However, amendments to the Act in Public Law 100-711 of November 23, 1988, contained a provision allowing for the incidental take of most marine mammals in commercial fishing operations for the 5-year period ending October 1, 1993. The Service is considering what actions should be taken on the pending proposal in light of the passage of the 1988 Amendments.

Marking, Tagging, and Reporting Regulations

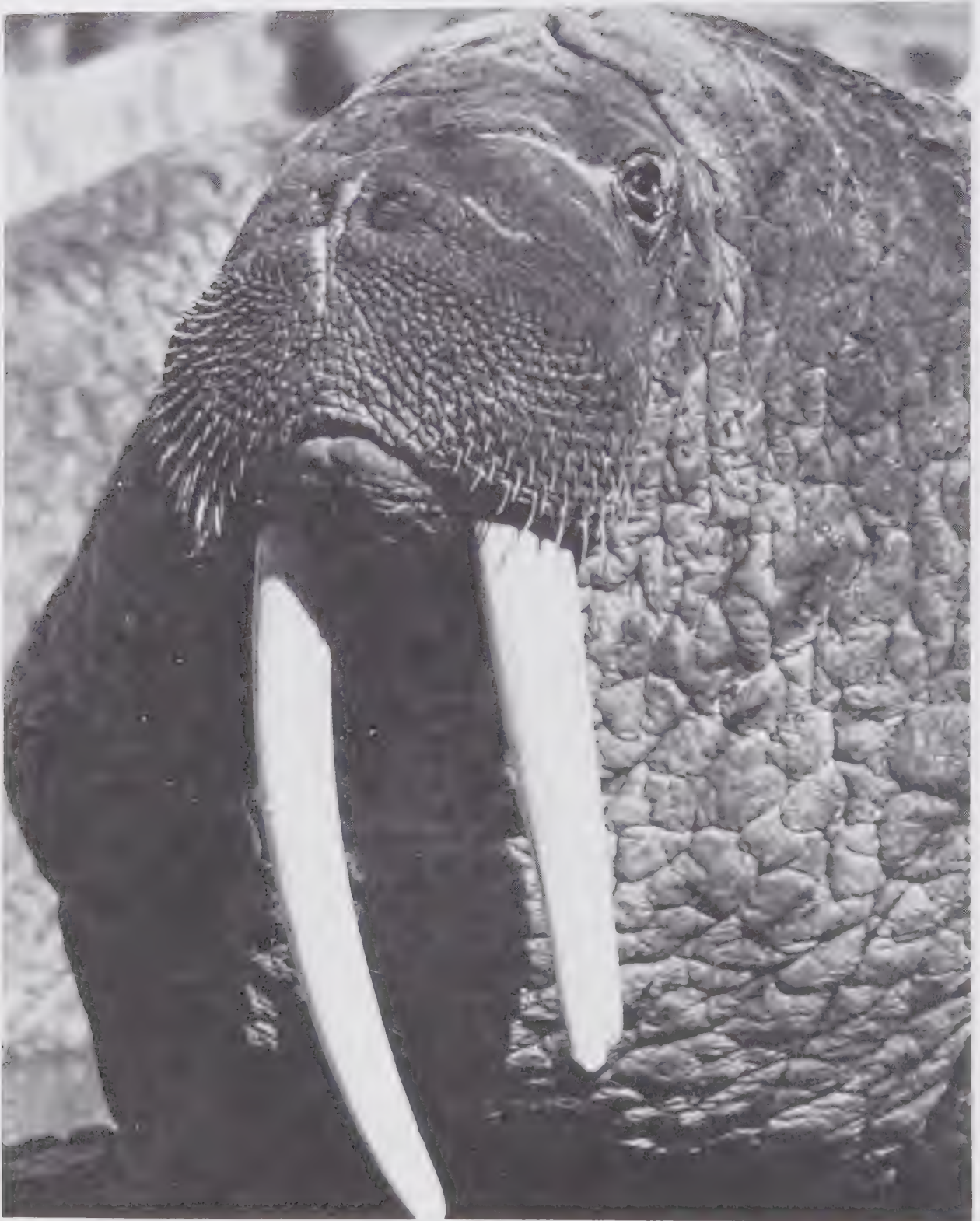
Final regulations governing the marking, tagging, and reporting of marine mammals harvested by Alaskan Natives for subsistence or handicraft purposes were published in the Federal Register on June 28, 1988, with an effective date of October 26, 1988. These regulations implement a 1981 amendment to the Act and will assist the Service in monitoring the Native harvest and in obtaining biological data needed for management purposes. Additionally, the regulations will help control the illegal take, trade, and transport of specified raw marine mammal parts.

This new program requires that all polar bear hides and skulls, all sea otter hides and skulls, and walrus tusks be marked or tagged within 30 days of the kill. Information on the total harvest of these species will be collected, as well as location of the kill, sex and age data, and measurements of skulls and tusks. The program is being implemented by about 100 local representatives State-wide, most of whom are on contract to the Service. The regulations require that pre-rule specified parts be marked or tagged within 180-days (by April 25, 1989). Information collected from the new program will be published in the Service's annual report beginning in 1989.

Walrus

The Service continued to participate with the Pacific Walrus Technical Committee and was actively involved with the Eskimo Walrus Commission. Numerous informational meetings occurred in association with harvest monitoring activities and the marking, tagging, and reporting regulations.

In July, two Soviet scientists participated in an exchange program involving the immobilization and radio tagging of walruses to determine haulout



A walrus with a broken tusk. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

frequencies of females on pack ice, and movement patterns. These activities took place under the US/USSR Cooperation in Environmental Protection Agreement, signed in 1972. The Soviet scientists also met with hunters in Savoonga to discuss harvest strategies and other issues of mutual interest such as the harvest of walrus by Alaskan Natives and perceived population trends. The Soviet biologists urged hunters to utilize harvested walrus to the maximum extent possible.

Cooperative surveys of the Pacific walrus population have been conducted by the U.S. and Soviet Union every 5 years since 1975. Discussions on aerial survey methodology, timing, and location for the 1990 joint census were held in July. In September, American and Soviet scientists met in Tallinn, U.S.S.R., and agreed to cooperatively test survey techniques in the Bering Strait during the summer of 1989, with an exchange of personnel. Results of this work will help improve 1990 survey design.

The Service continued to monitor the spring walrus harvest in six villages in the Bering Sea (Table 1). The harvest totaled 1,925 animals. This is the lowest recorded in the last 9 nine years and is 30 percent below the average harvest for that period. The harvest was comprised of 757 males (39 percent), 791 females (41 percent), 177 sex unknown calves (9 percent), and 200 sex unknown adults (10 percent). The harvest of adult female walruses was the second lowest recorded since the Service began harvest monitoring in 1980. The St. Lawrence Island villages of Gambell and Savoonga were involved in an extensive search for a crew of lost walrus hunters who were missing for 21 days before being rescued. The search required these villages to forego hunting efforts.

Table 1. Observed 1988 Spring Walrus Harvest at Six Locations in the Bering Sea, Alaska.

Village	Male	Female	Calves, Sex Unknown	Adults, Sex Unknown	1988 Totals	1980-88 Average
Nome	25	1	-	13	39	214
King Island	11	19	1	70	101	194
Wales	35	62	5	8	110	170
Little Diomede	266	394	40	-	700	698
Savoonga	73	10	4	-	87	492
Gambell	347	305	127	109	888	994
Totals	757	791	177	200	1,925	2,762

The number of walrus hauling out at two locations in northern Bristol Bay (Round Island and Cape Peirce) during the non-breeding season declined roughly 60 percent in 1987 and remained low in 1988. A joint-venture fishery for yellowfin sole began to operate in the northern Bristol Bay area in 1987. Observers on Round Island (within the Walrus Islands State Game Sanctuary) have reported that noise generated by the yellowfin sole fleet was quite loud, even from vessels as far as 5-10 miles from the Island. The Service is examining the possibility that these sounds (both airborne and waterborne) may be influencing

the number of walrus utilizing the area. Other factors such as declining food resources and fluctuating environmental conditions also may be implicated. In response to concerns raised by the State, the Eskimo Walrus Commission, and other groups, the Service is working with the North Pacific Fishery Management Council to propose seasonal closure alternatives that would restrict yellowfin sole fishing within various distances from walrus haulout sites in northern Bristol Bay. These activities will continue into 1989.

A contract to analyze teeth collected during 1985-87, and stomach contents and reproductive organs collected in 1985 continued with a report on the results expected in early 1989.



A sea otter in Alaska. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

Sea Otter-Alaska

Major management concerns in Alaska include: (1) the effects of sea otter populations on shellfish fisheries; (2) the effects of commercial fisheries on sea otter populations; (3) the legality of Native harvest for the creation of handicrafts and clothing; and (4) the need for a Statewide population survey. A cooperative marine mammal-fishery interaction study was initiated in the Cordova-Copper River delta area. Funding was provided by the Service and the Sea Grant Marine Advisory Program. Objectives of the study are to: (1) document rates of damage to netted fish and to fishing gear by marine mammals; (2) assess the rate of incidental take of marine mammals in the salmon drift gillnet fishery; (3) document the number and species of marine mammals taken and the circumstances; (4) investigate causes of mortality through necropsy of beached carcasses; and (5) develop means for reducing impacts between marine mammals and commercial fishing. A progress report will be completed in early 1989 and field work will be completed in summer 1989.

Based on reports from registered agents and tanneries, there has been concern about an increasing take of sea otters, particularly with respect to impacts on small subpopulations. Registered agents and tannery reports are only an indicator of the harvest by Alaskan Natives. There is no information on the number of hides home-tanned. In 1987 there were records of 393 hides taken. This is comparable to 385 in 1985, and fewer than the 555 taken in 1986. If these numbers accurately reflect the trend of the total harvest, the decrease may be due in part to uncertainty resulting from on-going litigation concerning what items are authentic Native articles of handicrafts and clothing that may be sold under Section 101(b) of the Act.

On July 6, 1988, Administrative Law Judge Rampton ruled in favor of the Service as Complainant, concluding that sea otter fur flowers, mittens, teddy bears, and pillows were not authentic (traditional) Native handicrafts and clothing and that the selling of these items violated the Act. On July 27, 1988, U.S. District Court Judge Holland invited the Service to clarify previous policy guidelines and rulings relating to Native take of sea otters for handicraft purposes. A proposed rule to that effect was published in the Federal Register on November 14, 1988. The proposed rule would not affect continued Native take for subsistence purposes, but would clarify that sea otters cannot be taken under Section 101(b) of the Act for the creation and sale of articles of handicrafts and clothing. The proposed rule was still open for public comment at the end of 1988. Several hundred comments had been received from groups and individuals in Alaska and other States, and the rulemaking process will be carried forward into 1989. (Note: The original comment period on the proposed rule ran through January 13, 1989. It was subsequently extended through November 30, 1989, to allow time for submission of additional comments, and for public meetings to be held in selected locations of coastal Alaska within the range of the sea otter, and California.)

An Alaska Sea Otter Commission was organized in late 1988. Commission members are Natives selected from villages in each of the six coastal Native Regions in Alaska within the sea otter's range. The Commission intends to use the highly successful Eskimo Walrus Commission as an organizational and operational model. The Sea Otter Commission is expected to offer a forum for discussion of

management and policy issues with Native users. The sea otter population in Alaska is dynamic, continuing to increase and to expand into historic range. While portions of the Alaska population have been surveyed in the past, a State-wide survey never has been conducted. It is essential that this information be collected soon in order to complete an assessment of sea otter population status relative to optimum sustainable population level. This assessment is a necessary component of a meaningful sea otter management plan.

Polar Bear

Collection of harvest data from Native hunters continued as in previous years. From July 1987 to June 1988, the annual harvest season, a total of 121 polar bears were harvested in 13 villages (Table 2 and Figure 1). This is slightly less than the eight year average of 130 bears per year. Harvest chronology was bimodal, with peaks during November to January (40 percent) and March to April



A wary polar bear. U.S. Fish and Wildlife Service photo by the Alaska Fish and Wildlife Research Center.

(42 percent); the remaining 7 months accounted for only 18 percent of the harvest. Harvest of bears by villages west of Point Lay comprised 74 percent of the total harvest while Point Lay and the villages lying to the east comprised 26 percent. The designation of northern and western stocks is hypothetical while research continues to discern stock discreteness.

The 1987-1988 sex ratio of known sex animals in the harvest was 60 percent males and 40 percent females (Table 2). The age class composition of the harvest was 35 percent cubs less than 3 years of age, 24 percent subadults, and 41 percent adults. Some recently independent animals in their third year of life may have been included in the cub category. Age composition of harvested animals has varied annually. During this reporting period the average age of females taken was 6.8 years (S.D. of 4.2) and the average age of males taken was 5.3 years (S.D. of 4.7). Females harvested in the western area averaged 4 years older than females harvested in the northern area. The opposite was true for males, with those harvested from the northern area averaging 4.2 years older. These data may reflect the greater availability of breeding age males to nearshore hunting communities in the northern area during the spring period.

The following historic information on removal dates focuses on the critical female component of the harvest. From 1925-1953 the mean harvest of bears was 117 per year, while from 1954-1960 it was 158 bears. Sex composition of the harvest was not noted for either period. The mean harvest for the 1960-1972 period was 260 bears, of which an average of 63 (25 percent) were females. From 1973-1979 the mean harvest was 86 bears, of which an average of 37 (43 percent) were females. From 1980-1988 the mean harvest was 130 bears, of which 47 (36 percent) were females. The harvest during the 1987-1988 period was at least 45 females (40 percent) and included 8 sex unknown animals. Currently, the percentage of females in the harvest has increased while the overall harvest is less than for the 1960-1972 period. Further, the removal during the 1960-1972 period, by regulation and hunter preference, concentrated on larger adults and likely did not include dependent animals nor smaller subadult females to the degree of today's harvest.

Analysis of claw samples collected from harvested and research-captured animals found that isotopic carbon and nitrogen levels were different for bears in northern and western Alaska. A current study is examining the feasibility of utilizing elemental isotopic levels to discriminate between bears utilizing these areas. A management application of this research is to determine from which stocks hunters are harvesting bears and at what rates. Kidney specimens provided to the University of Alaska-Fairbanks, in cooperation with the Service's Alaska Fish and Wildlife Research Center, were used for mitochondrial DNA genetic analysis in an effort to differentiate between stocks.

Polar Bear Management Agreement:

The Service provided technical assistance to the North Slope Borough Fish and Game Management Committee in Alaska, and Inuvialuit Game Council in Canada, in their development of a Polar Bear Management Agreement (Agreement). This Agreement was signed on January 29, 1988, and focuses on cooperation in managing and maintaining a viable polar bear population that is shared between the Inuvialuit (Northwest Territory, Canada) and Inupiat (northern Alaska)

Table 2. Alaskan Polar Bear Harvest: July 1, 1987, to June 30, 1988.

Village	Male	Female	Sex Unknown	Total
Barrow*	8	2	3	13
Diomede	12	7		19
Gambell	11	12		23
Kaktovik*	3	3		6
Kivalina	3	2		5
Nome		3		3
Nuiqsut*			1	1
Pt. Hope	3	5		8
Pt. Lay*	1		1	2
Savoonga	7	4		11
Shishmaref	9	2	1	12
Wainwright*	7	2		9
Wales	4	3	2	9
Total	68	45	8	121

* Northern Alaska "stock"

peoples. The major objectives of the Agreement are to: (1) protect female polar bears; (2) minimize effects of human activities; (3) manage bears on a sustained yield basis; (4) promote research; and (5) encourage the wise use of bear products and by-products.

The Service, as a technical advisor to the Agreement, participated with Borough personnel in village meetings designed to explain the Agreement and solicit support. The Alaskan villages affected by the Agreement include Kaktovik, Nuiqsut, Barrow, and Wainwright. In October, Commissioners and Technical Advisors met to discuss the annual allocation Agreement as stipulated, and provided the following recommendations for approval by the respective jurisdictions:

1. That the following guideline harvest levels be established for polar bears:

Western Canada	38 bears annually
Alaska	38 bears annually

That the guideline harvest levels be based on the following assumptions:

- a) The size of the northern polar bear population is estimated at 1,800-2,000. (The population estimate may change as new information becomes available.)
- b) The sex ratio of the harvest is 2/3 males to 1/3 females.

Figure 1. Location of Alaskan Polar Bear Harvest: July 1, 1987 to June 30, 1988.



2. That the Service, in consultation with the Alaska Department of Fish and Game, the North Slope Borough, and Canadian wildlife agencies, develop guidelines for monitoring and mitigating conflicts between polar bears and human activities.
3. That all possible means be used to reduce the proportion of female polar bears in the harvest.
4. That an information and education program on the Polar Bear Agreement be undertaken in both countries.

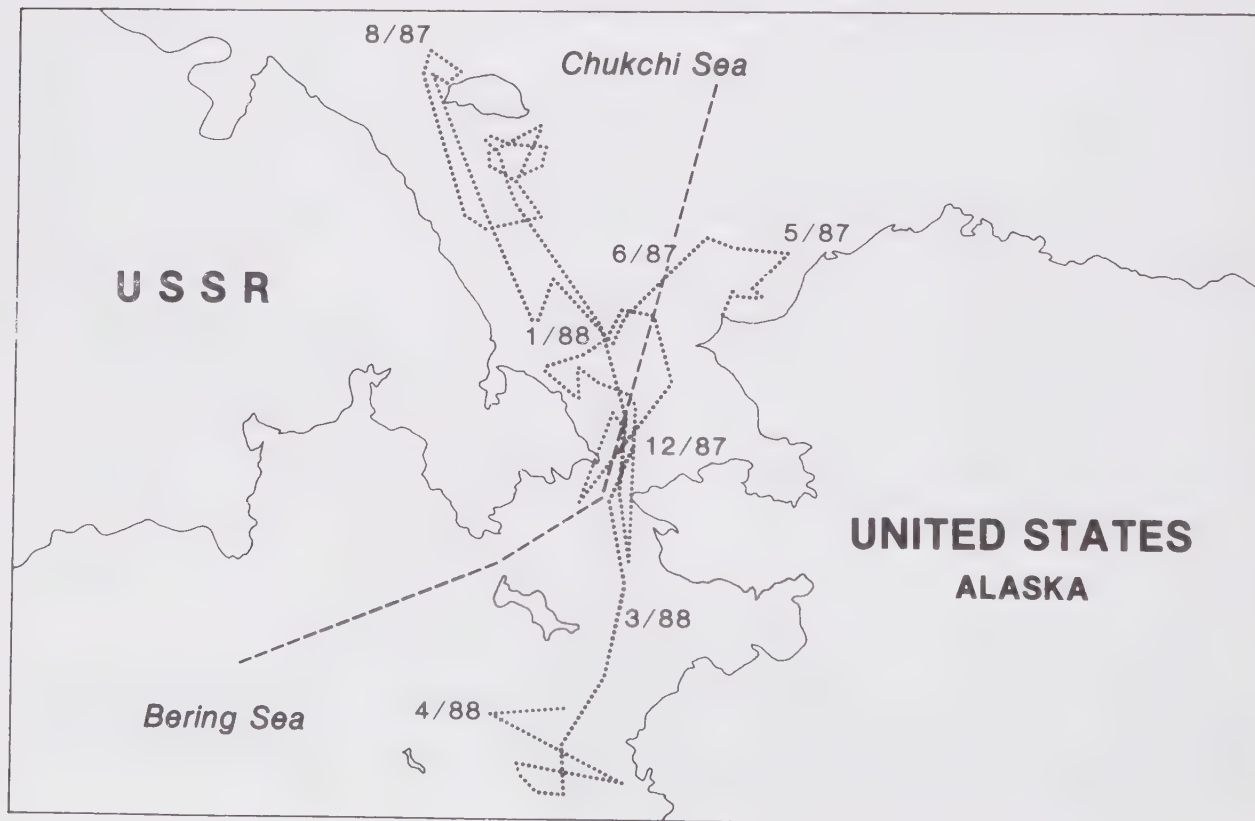
These harvest guidelines are significant because their implementation marks the first time since passage of the Act that a harvest limit based on sustained yield principles has been placed on polar bears. Furthermore, implementation is by the individuals most affected by the Agreement. Recognition of the need

for an active management program for this area is the basis of the Agreement. The Northwest Territories Department of Renewable Resources in cooperation with the Service, the North Slope Borough, and the Inuvialuit Game Council, initiated production of a slide show and information poster to be distributed to local villages.

Alaskan Issues Meetings

The Service participated in the Canadian Polar Bear Technical Committee meeting held in February 1988, in Yellowknife, Northwest Territories, as well as the tenth meeting of the International Union for the Conservation of Nature and Natural Resources, Polar Bear Specialists Group, held in Sochi, U.S.S.R., in October 1988. The Service was invited to participate based on mutual interests in the shared Beaufort Sea polar bear population. This year's workshop focused on modeling of polar bear populations, information needs, methodology, and applications for managers.

Figure 2. Movements of a female polar bear, Number 6724, in the Chukchi and Bering Seas during 1987 and 1988. The locations, obtained by satellite telemetry, emphasize the international sharing of bears in this western population.



The International Union for the Conservation of Nature and Natural Resources Specialists Group continued to promote the exchange of research and management information between member jurisdictions and guaranteed Soviet participation. Twelve resolutions were enacted, four of which directly involve the United States. The most important of the resolutions called for collaborative research and management activities in the Chukchi Sea area between the Soviet Union and the United States. This resolution is supported by terms of the International Agreement, Article VII, which establishes the framework for the coordination and consultation of research and management activities on migrating polar bear populations common to the jurisdictions (Figure 2). The atmosphere for joint endeavors is favorable. The Soviets are contemplating reinstituting a polar bear harvest for the first time since 1956. Therefore, it is imperative that information on basic population parameters be collected and the subsequent effect of different harvest rates on the population be modeled in order to monitor population status relative to "optimum sustainable population." Collaborative efforts will be required to achieve these goals.

Another resolution requested the United States to develop regulations prohibiting the use of aircraft in the harvest of polar bears. This activity has not been common although it is not specifically prohibited by the Act. The last two pertinent resolutions were advanced by Canada and the Soviet Union. These requested assistance in collecting biological specimens to be used in studies designed to evaluate population discreteness and contaminant levels on a circumpolar basis.

Sea Otter-Southern

The southern sea otter in California is a remnant of the sea otter species that once ranged throughout the northern and eastern Pacific Coast. In the mid-1700's, the sea otter was recognized as a valuable fur-bearing animal, and commercial exploitation began. The historical population in California is estimated to have been 16,000-18,000 individuals. By 1910, the species had been virtually exterminated from its entire range except for remnant populations in Russia, Alaska, the Queen Charlotte Islands (British Columbia), central California, and the San Benito Islands (Baja California). Even though the International Fur Seal Treaty of 1911 promoted protection of sea otters on the high seas, by 1920 the British Columbia and Baja populations were also extinct.

In 1913, the California State Legislature protected the sea otter from exploitation, although there were apparently very few sea otters left in California. Those that survived were probably concentrated in the Point Sur area. In 1938, 50 otters were noted at Bixby Creek in Monterey County, just north of Point Sur.

Fully protected against take, the population subsequently grew in number and range. By 1970 the population had become reestablished in about 10 percent of its historic California range. However, between the early 1970's and mid 1980's, little or no growth in numbers has been observed, although the range has expanded somewhat. In 1977 the southern sea otter, already afforded the protection of the Act, was listed as a threatened species under the authority of the Endangered Species Act. The sea otter's physiological vulnerability to

oil and greatly reduced population size and distribution, combined with threats of oil spills resulting from increasing tanker traffic near the central coast, were the primary reasons for its being listed.

The California Department of Fish and Game (Department) and the Service again conducted a spring survey in 1988. The area surveyed included the entire 220-mile long established range of the southern sea otter population, from Point Ano Nuevo in Santa Cruz County to the Santa Maria River in San Luis Obispo County, plus additional peripheral habitat. The total numbers of otters counted during the spring 1988 survey was higher than any since these counts were first begun (Table 3). Efforts necessary for the second year of translocation precluded a fall survey in 1988. As a rule, fall counts are consistently lower than spring counts. This may, in part, be due to the fact that sea otters are more difficult to observe in the fall owing to their increased dispersement throughout the range, and, in part, to the greater abundance of bull kelp during the fall, which obscures some otters. In the spring, the giant kelp is more clumped and there is little bull kelp to contend with; therefore, the otters are easier to count. The Service will likely scale back to only spring surveys for the purpose of monitoring population trends. Most otters are still found between Monterey and Morro Bay.

Table 3. Comparison of Southern Sea Otter Counts Conducted Since the Spring of 1982.

<u>Season</u>	<u>Number of Independent Otters</u>	<u>Number of Pups</u>	<u>Total</u>
1982 Spring	1,124	222	1,346
Fall	1,194	144	1,338
1983 Spring	1,131	120	1,251
Fall	1,062	164	1,226
1984 Spring	1,181	123	1,304
Spring*	1,151	52	1,203
Fall	No survey		
1985 Spring	1,124	236	1,360
Fall	1,066	155	1,221
1986 Winter	1,231	181	1,412
Spring	1,345	225	1,570
Fall	1,088	113	1,201
1987 Spring	1,430	220	1,650
Fall	1,263	104	1,367
1988 Spring	1,505	219	1,724
Fall	No survey		

* California Department of Fish and Game aerial survey with ground truth stations.

Translocation of Southern Sea Otters:

Translocation of southern sea otters to establish a second breeding colony was initiated in 1987. The purposes for establishing a second colony are two-fold: (1) to eliminate the possibility that more than a small proportion of the population would be decimated by any single natural or human-caused catastrophe; and (2) to obtain data for assessing translocation and containment techniques, population status, and the influence of sea otters on the structure and dynamics of the nearshore community. The latter information is particularly important in attempting to understand the characteristics and impacts of a sea otter population at its optimum sustainable level. A Final Environmental Impact Statement (Statement) was distributed by the Service in May 1987. The Final Statement considered all available data and information and evaluated potential effects of the translocation on the marine environment, the southern sea otter, and the socioeconomics of the region. The Final Statement and the record of decision issued in August 1987 reflect the Department of the Interior's consideration of all comments received from the public and Federal, State, and local officials.

The Service was provided clear authority under Public Law 99-625 (November 7, 1986) to translocate southern sea otters and to implement long-term management of the proposed experimental population. The Service included the guidelines, terms, and authorities of this law in the preparation of the Final Statement and incorporated these into a final rule (i.e., final regulations) and record of decision.

Public Law 99-625 is a free-standing provision based on concepts similar to the Endangered Species Act and contains five key elements:

1. The authorization and procedure for the relocation, protection, and management of a second colony of southern sea otters;
2. Requires designation of two zones: a "Translocation Zone" that must provide the habitat necessary for furthering the conservation of the sea otter and a buffer zone to protect the population from activities occurring elsewhere, and a "Management Zone," or otter-free zone, to minimize potential conflicts between fisheries and other resource users and the translocated population;
3. Establishes the status of otters from the experimental population under the Endangered Species Act. The applicability of Section 7 and Section 9 requirements of the Endangered Species Act, as well as the prohibitions on taking under the Act, differ with respect to the two zones;
4. Allows those interests affected by the proposed sea otter translocation to obtain early consultation on the consequences of their activities; and
5. Requires a description of the relationship of the translocation to the overall status and recovery of the southern sea otter and to future Section 7 determinations under the Endangered Species Act.

This law provides the authority and establishes the guidelines for carrying out the translocation activity.

The final rule established the boundaries of the Translocation Zone to which otters have been translocated and given protection similar to that of the parent population, and a Management Zone to be maintained otter-free by non-lethal means. The Translocation Zone consists of San Nicolas Island and surrounding waters in the Southern California Bight, ranging from 10-19 nautical miles from the 15-fathom contour surrounding San Nicolas Island. The Management Zone includes the remainder of the Southern California Bight south of Point Conception, including the other offshore islands and mainland coast. As such, it implements a significant form of zonal management, as recommended by the Marine Mammal Commission in 1980.

Capture operations were initiated on August 24, 1987, and implemented in accordance with the Translocation Plan contained in the Final Statement for the translocation of sea otters. Analysis of data obtained during the initial year of translocation provided some useful insight into factors that apparently contribute toward the successful translocation of sea otters. By comparing the weights of sea otters that have remained at San Nicolas Island with those of the sea otters that have returned to the mainland, small (juvenile) otters weighing between 25 and 35 pounds have been determined to be more likely to remain at the Island than large (adult) animals that weigh more than 35 pounds. Based on this information, the Service modified the Federal translocation regulations to transport only sea otters with capture weights between 25 and 35 pounds to San Nicolas Island during subsequent years. The sex ratio of males to females that are taken to San Nicolas Island will be determined by how closely the sex ratio of the sea otters at the Island corresponds to the desired ratio of one male to four females. The regulations were also amended so that beginning the second year sea otters could be flown to the Island in smaller groups than during the first year, probably as single sea otters, or in pairs. At the Island, the sea otters no longer must be held in holding pens, but can be immediately released.

Capture and Monitoring Operations:

Capture operations for the second year commenced on September 27, 1988, and were implemented in accordance with the amended regulation. Teams of biologists from the Service and the State effectively coordinated the capture, transport, and release of sea otters in the main range and on San Nicolas Island. Capture teams carried out their activities throughout the mainland sea otter range, from approximately Point Buchon north to Monterey Bay. Following capture, otters were taken to the Monterey Bay Aquarium where they were held for observation and examined by an experienced sea otter veterinarian. All otters were held a minimum of one day to monitor their behavior and minimize stress. From the aquarium, the otters were flown by charter plane directly to San Nicolas Island and released.

Status of Colony:

One hundred sea otters (25 males, 75 females) were translocated to San Nicolas Island during the period August 24, 1987, to December 12, 1988. As of mid-

December 1988, the disposition of 25 sea otters that are no longer at San Nicolas Island is known or suspected. Fourteen sea otters left the island and returned to the parent population. Another sea otter was found in the "no otter" Management Zone in southern California in late December 1987. She was caught, along with her newborn pup, and moved back to her original capture site on the mainland. Three males died at San Nicolas Island from "stress" related to their capture and transportation. Two females were found dead on beaches in southern California (one of these had been shot and the other cause of death was undetermined). Three sea otters are suspected of having died in fishing gear. Two radio-tagged sea otters probably died, based on their sudden disappearance. This leaves a theoretical population of 75 sea otters (100 minus 25) at the Island. However, during December 1988, only 27 of the 75 sea otters were identified at the Island leaving 48 otters unaccounted for (See Table 4).

Table 4. Summary of Southern Sea Otter Translocation Data.

<u>Cumulative</u>	<u>August 1987- August 1988</u>	<u>September 1988 - December 1988</u>	<u>Totals</u>
Number of sea otters translocated	69	31	100
Number at San Nicolas Island as of December 1988	9	18	27
Number known to have voluntarily returned to mainland range	14	0	14
Number taken back to mainland range	1	0	1
Known dead	10	0	10
Fate unknown	35	13	48

Summary of Mortality:

Necropsies were performed on otters that died during the translocation phase: five otters at the Monterey Bay Aquarium (three in 1987, two in 1988) and three at San Nicolas Island (1987). In all but one case, mortality was attributed to stress-related factors. One of the otters, a young female, was also diagnosed as having a severe case of pneumonia. This animal was ill when captured. Following the death of these six otters, precautionary modifications were made in the project to minimize the likelihood of additional mortality.

Five additional cases of mortality, which occurred at some unknown time after the otters were released at San Nicolas Island, have been reported. Carcasses were obtained in only two cases. Two otter carcasses were found on Ventura County mainland beaches in southern California, one at Point Mugu and one off Rincon Beach. These otters were sent to the Madison National Wildlife Health

Research Center for necropsy and forensic analysis. Both cases are still under investigation by the Service's Law Enforcement Division. Fishermen reported that two other otters drowned in lobster traps. In one report, the description of the otter's colored tags with inscribed numbers matched those of a sea otter released at San Nicolas Island. This identified otter has not been resighted and is presumed dead. A third otter with a San Nicolas tag was reported as incidentally taken in a gill net in the Management Zone. This otter has not been identified because the description of its tag fits the tags of two of the otters missing from San Nicolas Island.

To date there is one known sea otter birth at San Nicolas Island (1987). The mother and pup were observed for several days, after which the mother was seen alone. The pup is assumed to be dead. This observation was no cause for serious concern because female otters typically lose their first pup, and there is a high level of mortality in many sea otter populations.

Law Enforcement:

The Service employs two wildlife officers assigned to the Service's Ventura Endangered Species Recovery Office (Ventura Office) specifically for sea otter law enforcement and containment. Continuing concern for the welfare of the translocated sea otters has warranted routine patrol activities. Service wildlife officers continued to monitor sea otters and boat traffic around San Nicolas Island. Boat activity was monitored from the Island using Questar telescopes and by patrols of the surrounding waters using rigid-hull inflatable boats launched from shore. In addition, the patrol vessel "M/V Sea Otter" was pressed into service enabling wildlife officers to increase the range of operations into the sea otter Translocation and Management Zones. Commercial and recreational boat operators at San Nicolas Island were contacted during offshore patrols to solicit their voluntary cooperation in avoiding the areas of high sea otter use and to pass along information about the otter project in an effort to better inform the public.

There is still concern over incidental harassment of the translocated otters by otherwise legal boat activity. Observation of vessel/otter interactions have been monitored when possible by both wildlife officers and research biologists. Whereas disturbance of the otters is evident, the significance is still unknown.

There have been unverified reports of sea otters being caught and drowned in lobster traps set elsewhere in California and there is concern over the possibility of this occurring at San Nicolas Island. The number of commercial lobster traps set around the Island appears to have steadily increased during the months of October and November (lobster season begins the first Wednesday of October). By the end of November, three commercial lobster boats were working on a regular basis at San Nicolas Island. Estimates of numbers of traps set range from 300 to 500. Very few of these traps (less than 20) were set in areas known to be regularly inhabited by sea otters. Efforts to monitor lobster traps for incidental take have been limited; nevertheless, observations to date at the Island have not revealed any problems.

Law enforcement investigations have been conducted as a result of the sea otter translocation, and since 1987, include take of sea otters, sea lions, migratory birds, illegally set gill-nets, and discharge of firearms as follows:

1. Sea otters: The death of a San Nicolas Island sea otter found by the U.S. Navy onshore at Point Mugu is being investigated by the Service. Laboratory analysis indicated that the cause of death was a gun shot. This investigation is ongoing.
2. Sea lions: Service Special Agents and a National Marine Fisheries Service Agent conducted an investigation of the shooting of a sea lion at San Nicolas Island. These officers conducted surveillance prior to the shooting and subsequently conducted interviews to determine responsibility for the violation. The investigation was being conducted solely by the National Marine Fisheries Service. However, all suspects in the case were killed in a boating accident and the case was closed.
3. Migratory birds: Information was received by Service agents, while on San Nicolas Island, that two individuals in wet suits were observed shooting at sea gulls from a party fishing boat. Further, the boat was within the 300-yard limit established by the U.S. Navy as off-limits. A Service agent and a Navy security officer warned the vessel that it was in a closed zone. No further action was taken.
4. October 7, 1988, a vessel was observed pulling monofilament gill-nets on the northwest side of San Nicolas Island. The vessel was boarded by Service law enforcement personnel and the nets were determined to be illegally set in 15 fathoms of water. When boarded, approximately 700 yards of net was still in the water. Officers stood by while the remainder of the net was pulled. There was no evidence of sea otter mortality. The operators were informed of the 20 fathom closure surrounding San Nicolas Island.
5. On February 2, 1989, divers on a commercial sea urchin fishing boat were observed shooting from their boat by both a Service officer and Department game wardens. The observations were made from the shore of San Nicolas and the boat was later intercepted by Service and Department law enforcement personnel using a rigid-hull inflatable raft. The divers on board admitted to shooting and were informed of the State regulation prohibiting the use of firearms in the sea otter Translocation Zone. Two weapons were seized by the Department game wardens and citations were issued for violations of commercial fishing regulations.

Containment:

The containment program is designed to prevent sea otters from colonizing the Management Zone through a cooperative effort between the Service and the Department. Surveys confirm that no sea otter colonies are being reestablished in the Management Zone. The containment operation, as outlined in the

Translocation Plan and the Service's Containment Plan, consists of three interrelated and interdependent activities: surveillance of the Management Zone, the capture of sea otters in the Management Zone, and post capture relocation.

During the period covered in this report, the Service has received 24 potential sightings from individuals and government agencies, of which 8 were verified. Capture efforts were initiated on 3 occasions and one was successful. Two capture efforts were unsuccessful because the otters left the area prior to the arrival of the capture team. The remaining 5 otters that were verified (8 minus 3) were observed moving through the Management Zone, and apparently left the Management Zone on their own volition. Aerial surveys monitoring the Management Zone do not reveal new colonies becoming established there. Information obtained through the containment program strongly suggests that most of the reported sightings, if accurate, are of translocated otters "homing" back to the mainland range. The remaining accounts are of otters seen near Cojo Cove, just south of the northern boundary of the Management Zone. It is known that small groups of otters have been observed to migrate into that area. These otters are known to move back and forth across the Management Zone boundary.

Incidental Take Within the Mainland Range:

Several lines of direct and indirect evidence indicate that incidental drowning of sea otters in gill and trammel entangling nets has been, and continues to be, a significant source of mortality. From June 1982 to December 31, 1988, a total of 53 otters were observed drowned or otherwise known to have drowned in commercial fishing nets: 6 in 1982, 6 in 1983, 16 in 1984, 12 in 1985, 3 in 1986, and 5 each in 1987 and 1988. However, only a small proportion of the total entangling set-net effort within the sea otter's range was sampled for sea otter mortality. Therefore, the actual frequency of net-entanglement mortality for the California population is presumed to be substantially higher than indicated by the confirmed observation of 53 sea otters entangled in set-nets (through December 31, 1988). The calculated average number of sea otters estimated to have drowned in these types of nets during the 1982 to 1984 period was 80 per year or about 6 percent of the population annually. This source of mortality is considered by Service and State biologists to be the primary reason that the population did not grow during the early 1970's to mid-1980's.

On May 24, 1985, the Governor of California signed into law restrictions on gill and trammel net fishing (with net mesh equal to or greater than 3.5 inches) within the 15-fathom (one fathom equals 6 feet) isobath from Monterey to the Santa Maria River mouth. On September 20, 1986, to further protect sea otters and other marine mammals and birds from entanglement, legislation was enacted prohibiting gill and trammel nets inside the 20-fathom isobath along parts of the central portion of the sea otter's range, specifically between Point Sur and Pfeiffer Point in Monterey County and between Cape San Martin in Monterey County and Pico Creek in San Luis Obispo County. However, the Director of the Department has the authority to extend the 20-fathom closure throughout the length of the State's Sea Otter Refuge that comprises about 100 miles of coastline between the Carmel River (just south of Monterey Bay) and Santa Rosa Creek (just south of San Simeon) should subsequent observations of drowned otters warrant it. This legislation also provided funds for a low-interest loan

program for fishermen affected by the closures. Loans obtained under this program are to be applied to the development and purchase of alternative fishing gear.

The Governor of California approved regulations on September 16, 1987, affecting incidental take within the Translocation Zone. Gill and trammel nets cannot be used offshore of San Nicolas Island in water 20-fathoms or less. Furthermore, no person, except State, local, or Federal employees in the performance of their official duties, can discharge any firearms within the sea otter Translocation Zone. Incidental take of sea otters in the Management Zone is not a violation of the California or Federal Endangered Species Acts.

The emergency closures and protective legislation appear to have reduced the number of otters entangled in legally set nets, but no conclusion can yet be drawn on whether or how much the population growth rate will change. Based on beached-carcass counts, the total observed sea otter mortality (from all causes) for calendar year 1988 consisted of 84 otters, 7 less than in 1987 and 47 less than in 1984 (pre-closure year). The figures for beach-cast otters found in 1988 are 6 less than the long-term (16-year) average.

Section 7 Consultations:

Pursuant to Section 7 of the Endangered Species Act, the Service reviews proposed federally funded, conducted, or permitted activities that may affect the southern sea otter and issues Biological Opinions (Opinion) and recommendations to minimize impacts.

In 1988, the Service completed one formal Section 7 consultation involving the sea otter in California. That Opinion (1-6-88-F-53) was issued to the U.S. Air Force evaluating the effects of missile launch operations at Vandenberg Air Force Base, California. The Opinion concluded that otters would not likely be jeopardized by either the noise of missile launches or the exhaust gas clouds emanating therefrom.

Section 6:

The Service provides funding for sea otter conservation to the Department through Section 6, Grant-in-Aid to the States, of the Endangered Species Act. The State uses these funds to obtain an index of sea otter mortality and to determine the cause of death. The State program involves sea otter carcass salvage and necropsy, and documentation of incidental take of sea otters in commercial fishing nets.

The carcass salvage program involves computer cataloging of all verified observations of dead sea otters. Necropsies are performed on fresh carcasses and those animals suspected of being shot are x-rayed.

The State cooperated with the Service in the capture operations for translocation and in conducting spring and fall population counts discussed earlier. In addition, State fish and game biologists conducted bimonthly aerial censuses of the range peripheries to determine changes in distribution and seasonal abundance.



A West Indian manatee. U.S. Fish and Wildlife Service photo by Tom Taylor.

West Indian Manatee

The Florida Department of Natural Resources continued the Manatee Salvage/Necropsy Program. A total of 134 dead manatees was collected in the southeastern United States. Florida accounted for 133 cases, and one occurred in Georgia. Causes of death were categorized as collisions with boats or barges (43), crushing or drowning in lock or canal gates (7), other human-related (4), perinatal (30), other natural (24), and examined but undetermined (24). In addition, two dead manatee reports were verified, but the carcasses were not recovered. Total mortality and boat/barge-related mortality were higher than any year since the salvage/necropsy program was first started by the Service in 1974. Thirty-two percent of all manatee deaths in 1988 were attributable to boat/barge collisions, and 40 percent of the manatee deaths were human-related.

It is becoming increasingly obvious that a more constant and growing threat to the survival of manatees in Florida is linked to the rapid growth of the State's human population, 90 percent of which live within 10 miles of the coast. With a population increasing at a rate of 800 residents a day, Florida recently became the fourth most populous State in the nation. By the year 2000, it is expected to rank third. Also, accompanying the population boom has been the corresponding increase in the number of registered boats in the State. While there were only 100,000 registered boats in Florida in the early 1960's, there are now more than 675,000, and an additional 300,000 transient boats enter each year from out of the State. By the year 2000, these numbers are expected to double.

The seriousness of these impacts is clearly illustrated not only by the increasing number of manatee deaths associated with human-related causes, but also by the dramatic increase in the number of Endangered Species Act Section 7 consultations with the Corps of Engineers (Corps) on boat docks, marinas, and dredging projects affecting manatees and their habitats. In 1987 and 1988, the Service issued 15 and 16 jeopardy biological opinions, respectively, while in 1984 only 4 jeopardy biological opinions were issued.

To address this situation, the Service and the Florida Department of Natural Resources initiated actions to address cumulative impacts and strengthen the permit review process by developing area or site-specific Manatee Protection Plans. These plans are being developed with the assistance and cooperation of the Corps, State planning councils, county governments, and the public, and will establish development guidelines that can be used by developers and regulatory agencies to protect manatees and their habitats.

A second approach to strengthening the permit review process was the continuing development of a computer-based geographic information system. Such a system is expected to greatly facilitate review by integrating, mapping, and making readily available information on a local geographic area. Included in the data base will be manatee distribution and habitat use patterns, locations and numbers of boat-related manatee mortalities, vessel densities and use patterns, locations of boat speed regulatory zones, locations of existing boating facilities and trends in their development, zoning requirements, and a history of permit reviews and Section 7 consultations in the same geographic area.

In addition to these planning activities, the Service recognized the urgency for updating the West Indian Manatee Recovery Plan and its implementing document, the Comprehensive Work Plan. Neither the Recovery Plan nor the Work Plan had been updated since adoption in 1980 and 1982, respectively. As a result, program budget needs beyond 1984 were never fully elaborated, and changes to reflect progress on research and management tasks had not been incorporated since 1982. Therefore, in February 1988 the Service appointed a new Florida Manatee Recovery Team to revise and consolidate these two documents into one comprehensive Recovery Plan for the Florida subspecies of the West Indian manatee. The Recovery Plan for the Antillean manatee was revised in 1986. The technical draft of the new Florida Manatee Recovery Plan was distributed for review in November, and final approval is expected by early 1989.

Radiotelemetry field work on manatees continued on Florida's eastern coast. Twenty manatees were radiotagged during 1988. The objectives of this multiyear project are to determine movement patterns and to identify key use areas for future protection. Habitat loss due to development and direct mortality of manatees due to boat strikes are major problems on the east coast. Unlike populations studied in the past at other sites on the St. Johns River, northwestern and southwestern Florida, the ongoing studies in eastern Florida are beginning to reveal extensive and complex patterns of movement and habitat use. Seasonal migrations were noted between south Florida and Georgia, and movements up to 850 km were observed. In 1988, satellite-monitored platform terminal transmitters (PTTs) were used on nine animals, and proved to be highly effective means to track manatees over wide ranges. PTTs also proved to be much safer and significantly more cost efficient than the conventional VHF transmitters and aerial tracking methods. However, all of these systems continue to be employed in order to maintain a large sample of manatees.

Two captive manatees, a wild, recently rehabilitated, adult female and a young male raised in captivity from a calf, were tagged and released in June on Merritt Island. Both animals survived over the tracking period (thru December).

A study to characterize the seagrasses of Hobe Sound, Florida, and to determine the effects of boat-induced turbidity on this seagrass community which is utilized as winter food base for manatees, was continued. This research is a cooperative effort by the Service, the National Marine Fisheries Service, and the Florida Department of Natural Resources. Light sampling designs and seagrass productivity, distribution, biomass, and species composition investigations were implemented. Data currently being gathered will serve as a control for an experimental "no-wake" regulatory period to be established during later phases of the study.

Life history studies of manatees continued to be carried out based on longitudinal records of individuals recognizable from distinctive scar patterns. The photographic catalog of individuals maintained for these studies (with assistance from Florida Power and Light Company) continued to expand in 1988. Stomach content analyses for manatee food habit studies also continued and provided the Service and cooperators with valuable information on food types and preferences.

Field tests of aerial survey methods to determine a Statewide manatee population estimate were completed in 1987, and researchers agreed that the methods that were tested were not producing statistically comparable data. Increased efforts were made in 1988 to reevaluate survey methods and to eliminate the many variables that have historically adversely influenced surveys. The Florida Department of Natural Resources attempted to complete a Statewide survey, but the unseasonably warm weather prevented accomplishing this task.

Condemnation proceedings to acquire approximately 13 acres of water bottoms adjacent to the Crystal River National Wildlife Refuge for a manatee sanctuary were filed in Federal Court in 1986, and the case was finally adjudicated in December 1988. The court awarded the owner \$15,000 for the water bottoms,

eliminating the need to annually lease them during the winter months to provide critical warm water refugia and an inviolate sanctuary in Kings Bay, Crystal River, Florida.

The Service continued to support the Manatee Rescue Contingency Plan conducted through cooperative agreements with Sea World and Miami Seaquarium. The Florida Marine Patrol, through the "Resource Alert Watch Line," determines the validity of the reports of injured manatees and reports them to Sea World and Miami Seaquarium for rescue. The Service also established an agreement with Disney's Living Seas at Epcot Center to house captive born and rehabilitating manatees, and in June transferred two manatees, a male and female, to this facility which will receive 10 million visitors annually.

The Service and the State of Florida intensified habitat protection efforts in 1988, and committed to vigorously pursuing habitat acquisition projects in the Crystal River area. The State completed plans under its Conservation and Recreational Lands Program to acquire 150 acres of land surrounding the warm-water spring at the head of the Homosassa River. The Service completed its planning efforts to acquire approximately 3,000 acres at the mouth of the Homosassa River adjacent to the Chassahowitzka National Wildlife Refuge, and with the \$650,000 add-on appropriated by Congress for Fiscal Year 1988, immediately began efforts to acquire a site on Kings Bay for the subsequent development of a manatee interpretive/education center.

The Florida Department of Natural Resources continued to develop its manatee program. In 1988, emphasis was directed towards reviewing permits for boating facilities, upgrading and expanding the manatee regulatory boat speed zones, improving the salvage/necropsy program, cooperating with county governments to develop Manatee Protection Plans, and evaluating the effectiveness of State-wide aerial survey methods. Through the "Save the Manatee Club," the State also expanded its interpretive and educational programs. The Service and the Florida Department of Natural Resources enjoy a close and mutually supportive working relationship.

Training and technical assistance were provided international researchers and managers concerned with manatees in Australia, Ivory Coast, Mexico, Panama, and Saudi Arabia.

Dugong

Dugong radio-tracking studies continued in collaboration with personnel from the Zoology Department of James Cook University of North Queensland in Australia. Four dugongs were captured in the Starcke River area of northern Queensland in November 1987 and were tagged with satellite-monitored transmitters. The transmitters were monitored by the Tiros series of weather satellites by Service Argos in France. All four tags failed prematurely at 32, 47, 64, and 94 days when either the attachment assemblies failed or the floating transmitters were removed by Aborigines. Despite the early failure of the transmitters, considerable information on dugong movements was gathered. These data are being used by the Great Barrier Reef Marine Park Authority to develop site-specific management plans for dugongs. Additional transmitters,



A Hawaiian monk seal. U.S. Fish and Wildlife Service photo by James Leupold.

with modified attachment assemblies, will be deployed on dugongs captured in Morton Bay, near Brisbane, next year.

Hawaiian Monk Seal

As part of a production and population survey, Service biologists worked with National Marine Fisheries Service researchers on each island of the Hawaiian Islands National Wildlife Refuge (Refuge) tagging weaned pups and resighting tagged seals. They also conducted regular population censuses of monk seals at French Frigate Shoals and intermittent surveys at Midway Atoll and other islands of the Refuge. Service biologists cooperate regularly with National Marine Fisheries Service personnel on various research and recovery actions recommended in the Hawaiian Monk Seal Recovery Plan.

Entangled monk seals encountered during surveys throughout the Refuge were released from nets and other debris. Large nets that washed up on Refuge beaches

were burned to reduce the likelihood of entanglement with seals. Underdeveloped female pups from French Frigate Shoals were transported to Honolulu where they were rehabilitated for release at Kure Atoll in an effort to repopulate Kure.

Coordination of Service and National Marine Fisheries Service activities was emphasized during the year to ensure that their field work was carried out safely in these remote locations. Special Use Permits were issued, and Service employees assisted with logistic support where possible by providing aircraft space, boats, and radio contacts.

